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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/010,429 | 12/03/2001 | Teemu Sipila | 324-010624-US (PAR) | 7529 |
| 2512 | 7590 | 01/25/2006 | EXAMINER | |
| PERMAN & GREEN 425 POST ROAD FAIRFIELD, CT 06824 | | | WONG, LINDA | |
| | | | ART UNIT | PAPER NUMBER |
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Please find below and/or attached an Office communication concerning this application or proceeding.

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|------------------------------|-------------------------------|-------------------------------|--|
| Office Action Summary | Application No. 10/010,429 | Applicant(s) SIPILA, TEEMU | |
| | Examiner Linda Wong | Art Unit 2634 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 October 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Response to Arguments

1. Applicant's arguments, see Applicant's Arguments, filed 10/31/2005, with respect to the rejection(s) of claim(s) 1-26 under Yoshino have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Kakura (US Patent No.: 6754263) in view of Parr et al (US Patent No.: 5872816).

Priority

2. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. 20002692, filed on 12/08/2000 in Finland.

Claim Objections

3. **Claims 1,4-7,9-12,15,18-21,23-26** are objected to because of the following informalities:
 - a. **Claim 1 and 15**, recite the limitation "sampling a received signal". There is no correlation or connection between the recited limitation and the rest of the body of the claim. Please include a correlation or connection between "sampling a received signal" and the rest of limitations as recited the claim.
 - b. **Claim 1, line 12**, recites the limitation "searching for a symbol sequence". The limitation was recited in claim 1, line 1, thus to show antecedence, it is

suggested by the examiner that the limitation is changed to “searching for the symbol sequence”.

- c. **Claim 4, line 1**, recites the limitation “the number of differential terms”. There is insufficient antecedent basis for this limitation in the claim. It is suggested by the examiner to change the phrase to “a number of differential terms”.
- d. **Claim 4, line 2**, recites the limitation “if the impulse response contains only some high and/or ...”. The term “if” is indefinite. It is suggested by the examiner to change the term “if” to “when”.
- e. **Claim 5, line 1**, recites the limitation “the number of differential terms”. There is insufficient antecedent basis for this limitation in the claim. It is suggested by the examiner to change the phrase to “a number of differential terms”.
- f. **Claim 5, line 2**, recites the limitation “if the impulse response contains only some high and/or ...”. The term “if” is indefinite. It is suggested by the examiner to change the term “if” to “when”.
- g. **Claim 6, line 1**, recites the limitation “the highest possible number of differential terms”. There is insufficient antecedent basis for this limitation in the claim. It is suggested by the examiner to change the phrase to “a highest possible number of differential terms”.
- h. **Claim 6, line 3**, recites the limitation “the length of the channel memory”. There is insufficient antecedent basis for this limitation in the claim. It is suggested by the examiner to change the phrase to “a length of a channel memory”.

- i. **Claim 7, line 1**, recites the limitation “the magnitude of the impulse response values”. There is insufficient antecedent basis for this limitation in the claim. It is suggested by the examiner to change the phrase to “a magnitude of the impulse response values”.
- j. **Claim 9, line 2**, recites the limitation “the squared Euclidean distance”. There is insufficient antecedent basis for this limitation in the claim. It is suggested by the examiner to change the phrase to “a squared Euclidean distance”.
- k. **Claim 10, line 2**, recites the limitation “the squared Hamming distance”. There is insufficient antecedent basis for this limitation in the claim. It is suggested by the examiner to change the phrase to “a squared Hamming distance”.
- l. **Claim 11, line 2**, recite the limitation “the correlation ...”. There is insufficient antecedent basis for this limitation in the claim. It is suggested by the examiner to change the phrase to “a correlation...”.
- m. **Claim 12, line 2**, recites the limitation “the path metric formed so far.” There is insufficient antecedent basis for this limitation in the claim. It is suggested by the examiner to change the phrase to “the survivor path formed so far” as mentioned in claim 1, line 14.
- n. **Claim 15, line 13**, recites the limitation “searching for a symbol sequence”. The limitation was recited in claim 1, line 1, thus to show antecedence, it is suggested by the examiner that the limitation is changed to “searching for the symbol sequence”.
- o. **Claim 18, lines 1 and 2**, recites the limitations as claim 4.

- p. **Claim 19, lines 1 and 2**, recites the limitations as claim 5.
- q. **Claim 20, lines 1**, recites the limitations as claim 6.
- r. **Claim 21, lines 1**, recites the limitations as claim 7.
- s. **Claim 23, lines 2**, recites the limitations as claim 9.
- t. **Claim 24, lines 2**, recites the limitations as claim 10.
- u. **Claim 25, lines 2**, recites the limitations as claim 11.
- v. **Claim 26, lines 2**, recites the limitations as claim 12.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

- 4. **Claims 1-3 and 15-17** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kakura (US Patent No.: 6754263) in view of Parr et al (US Patent No.: 5872816).
 - a. **Claim 1**, Kakura discloses determining a reference signal using constraint conditions and the received signal (Fig. 1, labels 102 and output Serr), determining a differential terms or distance, which is inherent to the Viterbi algorithm (Fig. 1, label 103 Viterbi Calculation Circuit), using the reference signal, which already uses the constraint conditions (Fig. 1, label 104),

calculating a transition metric (Fig. 1, label 104) and continuously forming a survivor path (Fig. 1, label 105). Although Kakura does not disclose sampling a received signal, determining the channel response, selecting at least one of the highest reliable impulse response and determining a reference signal with the selection, Parr et al discloses sampling a received signal (Fig. 7, label 1002), determining and selecting the most reliable group of channel estimates (Fig. 3, labels 60 and 64) and calculating a reference signal using the channel estimates and the received symbols (Fig. 7, labels 1008 and 1010 and Col. 2, lines 20-38). It would be obvious to one skilled in the art to incorporate the components as disclosed by Parr et al into Kakura's invention by replacing the reference signal as generated by Kakura with the reference signal generated by Parr et al to reduce computational demands as compared to determining a channel estimate for every possible bit sequence for every burst and selecting the channel estimate with the smallest error statistic while maintaining a high degree of accuracy. (Col. 1, lines 40-67 and Col. 2, lines 1-5)

- b. **Claims 2 and 3**, Parr et al discloses determining the error or reference signal between the selected channel estimates and transmitted sequence using the selected group of channel estimates. (Fig. 7, labels 1008 and 1010 and Col. 2, lines 20-38)
- c. **Claim 15** inherits all the limitations of claim 1.
- d. **Claim 16** inherits all the limitations of claim 2.
- e. **Claim 17** inherits all the limitations of claim 3.

5. **Claims 4-9,12-14,18-26** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kakura (US Patent No.: 6754263) in view of Parr et al (US Patent No.: 5872816) and further in view of Kubo et al (US Patent No.: 6556632).
- a. **Claims 4 and 5**, Although Kakura and Parr et al does not disclose a description of the Viterbi or MLSE algorithm used, Kubo et al discloses a sequence estimator using the Viterbi algorithm, wherein the algorithm is altered to selected the optimum branch metric. The branch metric is calculated using the Euclidean distance algorithm, wherein the branch metric depends on multiple channel responses or estimates (Fig. 2, label 12 and outputs to branch metric) and inherently, provides an increasing in differential terms in the branch metric or transition metric. (page 8, paragraph [0107], lines 1-5, and page 3, paragraph [0033], lines 1-9) It would be obvious to one skilled in the art to use the Viterbi and/or MLSE algorithm disclosed by Kubo et al to improve channel characteristics using the smallest circuit. (Abstract, lines 11-13)
- b. **Claim 6**, Although Kakura and Parr et al does not disclose a description of the Viterbi or MLSE algorithm used, Kubo et al discloses a branch metric or transition metric, wherein the branch metric depends on the channel characteristics. Kubo et al inherently discloses the length of the branch metric would depend on the channel characteristics. (page 4, paragraph [0037] and page 8, paragraph [0107], lines 1-5) It would be obvious to one skilled in the art to use the Viterbi and/or MLSE algorithm disclosed by Kubo et al to improve channel characteristics using the smallest circuit. (Abstract, lines 11-13)

- c. **Claim 7**, Kubo et al discloses differential terms of the channel response depend on the characteristics of the channel response, which indicates that the magnitude of the channel is considered. (page 8, paragraph [0107] ,lines 1-5)
- d. **Claim 8**, Kubo et al discloses selecting optimum channel response or branch metric. (page 4, paragraph [0050]). It would be obvious to one skilled in the art to use the Viterbi and/or MLSE algorithm disclosed by Kubo et al to improve channel characteristics using the smallest circuit. (Abstract, lines 11-13)
- e. **Claim 9**, Kubo et al discloses differential terms using squared Euclidean distance. (Kubo et al page 1, paragraph [0033], lines 7-8) It would be obvious to one skilled in the art to use the Viterbi and/or MLSE algorithm disclosed by Kubo et al to improve channel characteristics using the smallest circuit. (Abstract, lines 11-13)
- f. **Claim 12**, Kubo et al discloses adding the branch metric to form a path metric. (Col. 3, lines 37-44) It would be obvious to one skilled in the art to use the Viterbi and/or MLSE algorithm disclosed by Kubo et al to improve channel characteristics using the smallest circuit. (Abstract, lines 11-13)
- g. **Claims 13 and 14**, it is obvious to one skilled in the art to use a computer, comprising components such as memory and software, to perform the method of finding the optimum path. It would be obvious to one skilled in the art to use a computer to compute the method to provide a quicker result and more efficient method of determining the optimum path.
- h. **Claim 18** inherits all the limitations of claim 4.

- i. **Claim 19** inherits all the limitations of claim 5.
 - j. **Claim 20** inherits all the limitations of claim 6.
 - k. **Claim 21** inherits all the limitations of claim 7.
 - l. **Claim 22** inherits all the limitations of claim 8.
 - m. **Claim 23** inherits all the limitations of claim 9.
 - n. **Claim 26** inherits all the limitations of claim 12.
6. **Claims 10-11 and 24-25** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kakura (US Patent No.: 6754263) in view of Parr et al (US Patent No.: 5872816) and further in view of Yoshino et al (US Patent No.: 5537443).
- a. **Claim 10**, Yoshino et al discloses applying tap coefficients or weights to output the selected channel impulse response. (Col. 11, lines 41-10 and Col. 4, lines 36-62) It would be obvious to one skilled in the art to incorporate adjusting coefficients of taps as disclosed by Yoshino et al into Kakura's invention to provide updated tap coefficients that reflects the channel impulse response to improve channel tracking properties and provide excellent receiving characteristics. (Col. 4, lines 60-62)
 - b. **Claim 11**, Yoshino et al discloses calculating the desired signal estimation and interference estimation using the correlation between the channel impulse response, the signal received and sequence candidates or symbols. (Abstract and Col. 10, lines 63-67 and Col. 11, lines 1-32)
 - c. **Claim 24** inherits all the limitations of claim 10.

- d. **Claim 25** inherits all the limitations of claim 11.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Linda Wong whose telephone number is 571-272-6044. The examiner can normally be reached on 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on (571) 272-3056. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Linda Wong

A handwritten signature in black ink, appearing to read 'Linda Wong', with a horizontal line drawn underneath it.

**DACIA
PRIMARY EXAMINER**